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Phys/ECE 564

Artificial Vision A Vital Component of Transhumanism

Abstract:

This paper presents the subject of artificial vision from a unique perspective—that of transhumanism. Transhumanism will define how we live in the future, and artificial vision will be a vital component.

Introduction:

Artificial vision is a part of a growing trend that will be exceedingly important in the coming years and decades. This is transhumanism—the eventual merger of sentience and machines. Transhumanism itself promises to be a revolution unlike any before. It changes so much about life that it is often referred to as the “Singularity”. A singularity is a point that is so high that it is essentially infinite. It is said that trying to predict life beyond the singularity is like trying to stare over an infinite fence.

Overview of Retinal Processing:

Light actually travels through most of the retinal machinery before striking the intended cells, known as photoreceptors. The photoreceptors are divided into rods and cones. Rods are for low light conditions while cones are for color and detail. These differences are due to a protein called opsin. The four different versions—three different colors for cones and one for the rods—create our sense of color. Any one cone will have only one color that activates it.

The photoreceptors synapse with bipolar cells, which in turn synapse with ganglion cells. The axons of ganglion cells make up the optic nerves, which heads to the thalamus in the brain.

Motivations

Correcting disabilities is the generally accepted motivation for artificial vision. One condition that will be affecting many more people as

they age is macular degeneration. Cruelly, this attacks the photoreceptors at the center of vision, making reading impossible.

The other condition is known as retina pigmentosa. This is a catch-all term for the degeneration of photoreceptors. But this paper is motivated by transhumanism, and there is plenty to like in artificial vision.

Something as simple as a blink would be unneeded with a truly artificial eye. Also, the blind spot would be eliminated of course. It only exists because the eye is wired essentially backwards. If the photoreceptors were towards the center of the eye, the optic nerve would not get in the way of photons. But beyond these minor improvements, the prospect of fully controllable custom vision is appealing.

Steve Mann has demonstrated goggles that project an image directly into his eyes for years. He can watch a video in total privacy, or even edit what his camera “eyes” see, for example editing out advertising.

Approaches

Optobionics recently published a study in 2004 of its artificial silicon retina (ASR) device. It was implanted below the retina to mimic the function of photoreceptors. 5000 artificial receptors were present compared to over 100 million in a healthy eye. Thus it can be seen that normal vision will remain much better. This unit is self contained and thus needs no external power supply or input. Thus, it could not be used for custom vision, as Mann’s appliance can be. This makes it less useful from a transhumanist perspective.

In 2002, Mark Humayun’s artificial retina was implanted in volunteers. It was situated above the ganglion cells. The prototype had only 16 electrodes, which obviously resulted in very blurry sight. The unit is powered and fed data wirelessly. Thus it can fulfill the role of Mann’s custom vision. He is currently working on a 32x32 implant that will have 1024 electrodes.

The earliest attempts, in 1978, were by a man named William Dobelle. He bypassed the brain entirely and attached his electrodes in the visual cortex. This could be viewed as a very elegant approach. No matter what happens to the eye and associated optic nerve (cranial nerve 2), this

approach could be used to restore eyesight. The thalamus, known as a relay station for all senses except smell, could serve as the sight for future brain implants.

Conclusions:

Progress is being made towards the goal of artificial vision from many different fronts. In time, we will all “see the future”.

References:

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